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Ionizing Radiation Safety

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ABSTRACT

This publication briefly describes the DRES ionizing radiation safety program, functions of the Radiation Safety Officer (Rad SO), user responsibilities and general procedures for working with radioisotopes.

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IONIZING RADIATION SAFETY

General

The use of radiation and radioactive materials in Canada is regulated, by law, under the Atomic Energy Control Act and the Atomic Energy Control Regulations. The Department of National Defence (DND) is not bound by either the provisions of the Atomic Energy Control Act or the regulatory jurisdiction of the Atomic Energy Control Board(AECB). DND users are bound by Canadian Forces Administrative Order (CFAO) 34-24 and the Handbook for Radioactive Material, C-02-040-003/TP-000, Ch/Mod 1-1994-04-27. A number of the rules quoted in this chapter are taken in part or in whole from the above regulations. Other rules that are described have been instituted by the Radiation Safety Officer (Rad SO) to ensure proper safety precautions are taken in the use of radioisotopes.

For purposes of this document, Ionizing Radiation is defined as electromagnetic radiation (gamma rays or x-rays) or particulate radiation (alpha particles, beta particles and neutrons) capable of producing ions, directly or indirectly, by passage through matter. The subjects of radio frequency and laser radiation are therefore not covered in this document and do not come under the jurisdiction of the Radiation Safety Officer.

Radiation Safety Officer (Rad SO)

The Radiation Safety Officer is appointed under the authority of the Director General, Defence Research Establishment Suffield (DG DRES). The Rad SO is answerable to DG DRES in all matters concerning ionizing radiation safety. Rad SO duties are described in the new Part 18 of the Handbook for Radioactive Materials.

It is the responsibility of the Rad SO to:

a. ensure user compliance of the regulations in the acquisition, use, storage, transportation, and disposal of radioactive materials;

b. provide consultation and advice regarding the implementation of controls for the hazards associated with radiation sources and the effectiveness of these measures;

c. supervise the radiological safety programme;

d. supervise the carrying out of routine monitoring to establish that no undue or unsuspected radiological hazard exists;

e. arrange for suitable disposal of radioactive sources and waste materials; and

f. report wilful or repeated violations of safe radiation practices to the responsible manager, usually the Section Head for the program of the Division involved.

Radiation Sources

The most common type of radioactive sources in use at DRES are:

a. Sealed Portable Sources:

These consist of varying amounts of radioactive material contained in sealed capsules or in their own castle designed for easy removal of the source. These particular sources are normally used in various moisture- and pressure-type gauges. When not in use, they are kept in appropriate storage containers. When in use, they are contained in suitable shields although occasionally they might be used fully exposed. A DND Directorate Nuclear Safety Compliance (DNSC) licence is required and must be posted in the storage location of these sources. Licence conditions must be adhered to without exception. DNSC licence conditions for the use of sealed radioactive sources are given at Annex A.

b. Open Sources (Radioactive Chemicals):

These are radioactive materials of various types that are often kept in unsealed containers and may be solids, liquids or gases. AECB rules for working with radioisotopes in an intermediate workplace will be adhered to when using this type of source. These rules, as per Annex B, will be posted in a prominent place in the workplace. DNSC licence conditions for the handling of this type of source are also given at Annex B. A DNSC licence is required and must be posted at the storage location. Licence conditions must be adhered to without exception.

c. Electron Capture Detectors:

These sealed sources are used in various types of analytical instruments such as gas chromatographs, etc. A DNSC licence is required and must be posted at the storage location. Licence conditions must be adhered to without exception.

Principal Investigator and User Responsibilities

Only persons with suitable training and experience are to work with radiation sources. It is the responsibility of every user to see that his/her exposure to ionizing radiation and that of others is kept to the lowest practicable level. In no case is a user to accumulate more than the maximum permissible dose of 5 mSv (0.5 rem) in one year. All users shall wear a Thermo Luminescence Dosimeter (TLD) radiation monitor badge, supplied by Health Canada and issued through the Radiation Safety Officer.

The principal investigator will be responsible for ensuring compliance with all radiological health procedures and DNSC licence conditions in the work areas under his/her jurisdiction. Specific responsibilities of the principal investigator are:

a. to ensure that the contents of these procedures and conditions are known and understood by personnel under his/her supervision who work with radioactive materials, any hazards anticipated with the work, and safety precautions attendant to his/her work. He/she will see that new personnel are instructed in a course of action to be taken in emergencies;

b. to ensure that proper use is made of personal monitoring equipment assigned to those under his/her supervision;

c. to supervise his/her area surveying program as established by the Rad SO;

d. to notify the Rad SO under the following circumstances:

   (1) when an overexposure to radiation is indicated or suspected;

   (2) when the area surveys show general and/or gross contamination in the workplace;

   (3) when radioactive material is lost or stolen; and

   (4) any other situation which the principal investigator believes could result in a hazard to persons occupying the area in question.

e. to advise the Rad SO of any substantial change in the nature of his/her experiments and/or use of facilities;

f. to ensure that copies of records requested by the Rad SO are forwarded promptly. Records include wipe tests surveys and an inventory of radioactive material; and

g. to supervise record keeping of the activity in his/her area, as requested by the Rad SO.

Radiation Work Areas

All workplaces or other work areas where a radiation hazard exists must be marked with appropriate radiation warning signs. If a source is kept in the workplace on a bench, in a cabinet, or on the floor, its presence must be indicated by a radiation warning sign adjacent to the source. In the case of a source being kept in a cabinet, a warning sign must be placed on the outside of the cabinet door.

The procurement and posting of the appropriate radiation warning signs, tapes etc., is a user responsibility. It is also the responsibility of the user to purchase the proper radiation monitoring equipment for swab and leak tests. The Rad SO will advise on these matters if required.

Controlled access to areas where radioisotopes are in use is a user responsibility.

Radiation Dose from Stored Radioactive Material in the Worksite

DNSC regulations state that:

The standard of protection required is based on the consideration that the dose rate at any point on the outside of the storage room, enclosure, or vehicle containing a radioactive source, when the door is closed, should be as low as possible. The dose rate must never exceed 25 microsieverts/h (25 μSv = 2.5 millirem/h) in a controlled access area or 2.5 microsieverts/h (25 μSv/h = 0.25 millirem/h) in an area open to the general public.

To comply with the above regulations and to document procedures to be used to protect DRES personnel and others from exposure to stored radioactive sources within DRES, the following shall be noted:

a. Building 5 is dedicated to storing radioisotopes (sealed sources etc.) that have a high level of beta or gamma activity. This is the one location within DRES where prolonged exposure could exceed the regulatory limit, as set out in the above regulation;

b. only authorized persons with the expressed consent of the Radiation Safety Officer will be allowed entry to this building; and

c. most radioactive material, used in DRES laboratories, is low level radiochemicals. If and when there is occasion to employ high energy beta or gamma sources, users will ensure that during any period of interim storage, at the worksite, that the following procedures are applied:

(1) sources will be stored in such a manner that persons in that worksite, as well as adjacent offices and/or laboratories, will receive a nil radiation dose exposure;

(2) dose rate readings will be taken at the surface and at one metre from the container in the area where it is stored;

(3) the area will be properly signed with this information including the nature and extent of the radiation hazard plus the identity of the source. If necessary the area will be cordoned off using appropriate warning tape etc.;

(4) likely areas on the walls, etc., in adjacent offices and/or laboratories will be monitored for a radiation field. Under no circumstances will a source be stored in a location where it is emitting a radiation field that is penetrating into an adjacent work area; and

(5) all such sources will be kept in the worksite only as long as they are in frequent use. When not is use, arrangements will be made, through the Radiation Safety Officer, to have them returned to the proper storage area in Bldg 5.

General Safety Rules for Working with Radioisotopes

To ensure the safety of DRES employees involved in the use of radioisotopes, the following rules will be observed to prevent overexposure or contamination of such employees.

These regulations are mandatory and failure to comply with them may cause the privilege of using radioactive materials to be revoked by the Radiation Safety Officer.

a. Signs shall be posted wherever radioactive material is located.

b. TLD radiation monitors shall be worn by all personnel approved to work with radioisotopes.

c. Work and storage areas suspected of contamination are to be monitored after the use of a radioisotope. Weekly wipe tests will be taken in each workplace under the supervision of the principal investigator. The wipes will be counted and the results will be forwarded to the Rad SO monthly.

d. In the case of a significant radioisotope spill or other contamination, the Rad SO shall be notified immediately. Contaminated materials are to be removed as soon as possible. Removal of contaminated material will be carried out using protective gloves and other necessary handling equipment for

protection from contamination. Contaminated materials are to be put in unbreakable, leak proof containers. The contaminated area will be checked for residual contamination. Clean up of a contaminated area is the responsibility of the laboratory personnel involved. The Rad SO will supervise clean up procedures.

e. All sealed portable sources and radioactive materials, except when they are in use, must be kept in containers properly labelled so as to indicate the contents and hazard. They are to be kept in the workplace only as long as they are in frequent use and after this time must be returned to the proper storage area.

f. Radioisotope users will check their radiation survey instruments at least quarterly to ensure they are operating and that the instrument batteries are in good condition.

g. No food is to be prepared, or eaten in areas where radioisotopes are stored or used. No utensils or food containers are to be brought into these areas.

h. No smoking will be allowed in areas where nonsealed sources are being used.

i. Employees shall wash their hands thoroughly before leaving an area where nonsealed sources are being used. Users will employ portable monitors to check for residual contamination after washing, if appropriate.

j. Persons having any type of open sores on their hands shall wear gloves when handling any radioisotopes. Persons working with gamma or high energy beta emitters shall wear gloves. Exceptions to this rule may be granted by the Rad SO upon written request.

k. Pipetting by mouth of liquids containing radioactivity is forbidden.

l. Radiation detecting instruments must be available to all radioisotope utilization areas. The radiation detecting instrument must be compatible with the particular type of radiation work being done in the area. Purchase of this equipment is a user responsibility. The Radiation Safety Officer will not supply survey instruments from his inventory for this purpose.

m. Long-handled tongs, gloves, smocks, shoe covers, respirators, and other necessary equipment are to be used whenever such safety measures are required. When in doubt as to whether special equipment is necessary, the user should consult with the Rad SO.

n. Users shall work with radioactive material in such a manner that possible spills will be contained. Namely, use absorbent paper (plastic backed), work in trays and work in a fume hood when possible.

o. It is the responsibility of the principal investigator to limit access into radiation utilization areas to those personnel authorized to work on the project.

p. Users will swipe test each sealed source and container for leakage whenever it is suspected that conditions of use may have physically damaged the source. This would normally include transportation for field use outside the workplaces, accidental dropping, unusual clamping and the like. Any sealed source found leaking must be reported to the Rad SO. Leakage from sealed sources must not be ignored.

q. Routine leak tests will be carried out on all sealed sources, as per schedule, according to the DNSC licence conditions for each corresponding source (see Annex A or Annex C).

r. Acceptable levels of contamination for a controlled area in a radioisotope lab are 5 Bq/cm^2 (averaged over an area of 100 cm^2) gamma and beta emitters and 0.5 Bq/cm^2 for other emitters. Uncontrolled areas have acceptable levels of 0.5 Bq/cm^2 for gamma and beta emitters and 0.05 Bq/cm^2 for other emitters.

Disposal of Low Level Radioactive Waste

The procedure for the disposal of **low level** radioactive waste is contained at Annex D (also see Figure D-1). Low Level radioactive waste in this instance is defined as waste normally generated through scintillation counting or other intermediate laboratory procedures.

Purchasing and Receiving

The following steps must be taken to purchase radioisotopes:

a. The principle investigator will forward any required supporting information to the Rad SO. The Rad SO will then ensure that the required purchase is covered under one of our existing DNSC Radioisotope licences and will give clearance to order.

b. The person ordering the radioisotope will ensure the DRES Material Supply Voucher is clearly marked, under the special instructions section, as Radioactive Material. This will alert the DRES Supply Group to the fact that the order will contain hazardous material. DND regulations require shippers

to have a copy of the appropriate licence before they can ship radioactive material to us. The Supply Group should contact the Rad SO in cases where a copy of a licence is required.

c. On receipt of the shipment, Supply will inform the Rad SO who will then personally inspect and approve it for release to the party requesting the purchase.

Inspections

a. Compliance inspections of DRES facilities are conducted on a biannual basis. These inspections involve two separate visits by the AECB, as the regulatory agency, and one by the Director Nuclear Safety Compliance (DNSC) for DND.

b. One AECB inspection is carried out by the Directorate of Fuel Cycle and Materials Regulation. This inspection is restricted to our radioactive waste management operating facility. The other, which is of direct concern to all DRES users/holders of radioisotopes, is a licence compliance inspection carried out, normally, by the AECB Western Regional Office, Calgary. AECB inspectors are required to go through DNSC to inspect DND establishments.

c. The biannual inspection by DNSC is also a licence compliance inspection and again directly involves all users/holders of radioisotopes.

d. The purpose of these latter two inspections is to inspect and approve facilities, confirm radioactive material holdings, including radiochemicals, and establish whether health and safety standards have been complied with in accordance with the Handbook for Radioactive Material and, as per conditions listed in our DNSC Radioisotope licences.

e. Inspectors, during these inspections, shall have access to all areas within DRES where radioactive materials are in use or stored.

f. It is the responsibility of user's/holder's of sealed sources (e.g., electron capture devices, Chemical Agent Monitors (CAMs), static eliminators, gauges, etc.) to ensure that leak tests have been performed in compliance with their respective DNSC licence conditions and that records pertaining to these tests are up-to-date and ready for presentation, upon request, to an inspector from either of the above agencies.

g. DND regulations state that an inventory of all radioactive-prescribed substances shall be maintained and must be forwarded to DNSC 2 as of 30

September, annually. The inventory shall include the LOCATION of all radioactive prescribed substances. In order to maintain an accurate inventory record, the Rad SO must be informed of any change of location of equipment containing a radioactive source.

h. Users of radiochemicals are to have their Radiochemical Inventory Register, Radiochemical Usage Forms and records of swab tests (contamination surveys) up-to-date and ready for presentation, upon request, to an Inspector from either of the above agencies. Typical forms are shown in Annex E.

i. The AECB "Rules for Working with Radioisotopes in an Intermediate Laboratory" are to be prominently displayed along with the appropriate DNSC Licence in those work areas that have been commissioned for radiochemical use.

j. The DRES Rad SO will host all inspections; however, the Inspector will be requested to direct all items and observations of non-compliance in the subsequent Inspection Report to the user/holder responsible, and to identify the laboratory/work area concerned.

k. A copy of the report will be sent directly to the person(s) cited, who will take corrective action forthwith.

l. Further as per requirement and within the time frame detailed on the inspection report, the person(s) cited will submit written notification to the inspecting agency (DNSC) outlining the details of action taken to correct the items of noncompliance.

ANNEX A

DNSC LICENCE CONDITIONS FOR SEALED SOURCES USED IN VARIOUS GAUGES AT DRES

Conditions

1. The source shall be in the shielded position when work is to be done on or in close proximity to the unit on which the gauge is installed.
2. Any repair or maintenance of the source holder or shutter mechanism, which requires access to or exposure of the source, shall only be performed by the supplier or persons authorized by DNSC for repairs done within the Department or by the Atomic Energy Control Board for repairs done outside DND.
3. A copy of this licence shall be prominently displayed on the licensee's premises.
4. An inventory of radioactive material shall be maintained and made available to the Atomic Energy Control Board upon request. The inventory shall include the location of all sources.
5. Devices containing radioactive material shall be clearly and durably labelled with a radiation warning sign and the nature and activity of the radioisotope involved. A clearly visible sign shall be located on or near the device indicating the identity (name or job title) and telephone number of the contact person.
6. In areas normally occupied by non-atomic radiation workers the radiation levels shall not exceed 2.5 μSv/h.
7. Any equipment malfunction which could adversely affect radiation safety shall be reported to DNSC within 24 hours.
8. The licensee shall ensure that when not in use, sources are stored in a secure location.
9. The radioactive material, whose use and possession is authorized by this licence, shall be used in accordance with the instructions provided by the manufacturer of the device, except in the event that these instructions conflict with the Handbook for Radioactive Materials or the terms or conditions of this licence, in which case the latter shall be complied with.
10. The licensee shall not transfer any radioactive material procured under the authority of this licence to any person who is prohibited pursuant to the Atomic Energy Control Regulations or DNSC from possessing such radioactive material.

11. Except for sources less than 50 megabecquerels or gaseous sources such as Krypton 85 and Tritium (H-3), leak tests capable of detecting the presence of 0.2 kilobecquerel of radioactive material shall be performed on each sealed source at least once every 12 months and after any incident which could result in source damage. Records shall be maintained for at least 3 years. If removable contamination in excess of 0.2 kilobecquerel is detected, the source holder shall be isolated, its use immediately discontinued, and DNSC shall be notified.

12. Any modification of the device(s) which could adversely affect radiation safety is prohibited without the prior approval of the Rad SO and DNSC.

13. Contact Rad SO for instructions on disposal of radioactive material.

ANNEX B

DNSC LICENCE CONDITIONS FOR OPEN SOURCES USED IN INTERMEDIATE WORKPLACES AT DRES

Conditions

1. An inventory of radioactive material shall be maintained and made available to the Atomic Energy Control Board upon request. The inventory shall include the location of all sources.

2. A copy of this licence shall be prominently displayed on the licensee's premises.

3. Handling procedures shall be in accordance with the "Rules for Working with Radioisotopes in an Intermediate Laboratory". These rules shall be posted where they are clearly visible to all users.

4. The Licensee shall ensure that only persons properly trained in work with radioactive material and informed of the hazards involved are allowed to handle radioisotopes.

5. Before any radioisotope facility or worksite is decommissioned, a contamination survey shall be performed and appropriate actions shall be taken to ensure that:

   a. levels of loose alpha radioactive contamination do not exceed 0.05 Bq per square centimetre averaged over an area not exceeding 100 square centimetres;

   b. levels of loose beta and gamma radioactive contamination do not exceed 0.5 Bq per square centimetre averaged over an area not exceeding 100 square centimetres; and

   c. the dose rate due to fixed contamination does not exceed 0.5 μSv per hour at 0.5 metre from any surface.

6. The licensee shall ensure that the levels of loose beta and gamma radioactive contamination on all controlled working surfaces in a radioisotope workplace do not exceed 5 Bq per square centimetre. In all other accessible areas, the levels shall not exceed 0.5 Bq per square centimetre. The contamination level may be averaged over an area not exceeding 100 square centimetres.

7. Where the licensee becomes aware of a dosimetry result exceeding the limits specified in Part 3 of the Handbook of Radioactive Materials, the licensee shall forthwith inform DNSC and the person of the result and shall investigate the cause and circumstances contributing to the result.

8. The licensee shall not transfer any radioactive material procured under the authority of this licence unless approval has been received by DNSC 2 and the receiving unit.

9. Contact Rad SO for disposal instructions.

10. Radioactive material authorized by this licence shall not be used in or on human beings.

11. The licensee shall provide any person working with radioactive material, other than hydrogen^{-3}, carbon^{-14} and sulphur^{-35}, with a TLD (thermoluminescent dosimeter) supplied by an agency approved by DNSC. The dosimeters shall be sent for measurement at least quarterly.

12. The licensee shall ensure that any person working with more than 50 MBq of phosphorus 32 or strontium 90 or yttrium 90 wear wrist or finger TLD monitors supplied by an agency approved by the Atomic Energy Control Board.

13. Bioassays for persons using Iodine 125 and/or Iodine 131 shall be performed when required by and in accordance with AECB regulatory document R-58 entitled "Bioassay requirements for Iodine 125 and Iodine 131 in Medical, Teaching and Research Institutions".

ANNEX C

DNSC LICENCE CONDITIONS FOR ELECTRON CAPTURE DETECTORS USED IN VARIOUS INSTRUMENTS AT DRES

Conditions

1. Physical contact with the radioactive source(s) shall be avoided.
2. An inventory of radioactive material shall be maintained and must be forwarded to DNSC 2 as of 30 September, annually. The inventory shall include the location of all sources.
3. A copy of this licence shall be prominently displayed on the licensee's premises.
4. Devices containing radioactive material shall be clearly and durably labelled with a radiation warning sign and the nature and activity of the radioisotope involved.
5. All electron capture detectors containing nickel 63 shall be leak tested at least once every 6 months (or 2 years if in storage). The test sample shall be taken from the outside surface of the detector around its exhaust outlet. The test shall be capable of detecting the presence of 0.2 kilobecquerel of radioactive material, and records shall be maintained for at least 3 years. If removable contamination in excess of 0.2 kilobecquerel is detected, the detector shall be immediately removed from service, and DNSC shall be notified.
6. The licensee shall not transfer any radioactive material procured under the authority of this licence unless approval has been received by DNSC 2 and the receiving unit.
7. The radioactive material, whose use and possession is authorized by this licence, shall be used in accordance with the instructions provided by the manufacturer of the device, except in the event that these instructions conflict with Handbook of Radioactive Materials or the terms or conditions of this licence, in which case the latter shall be complied with.
8. Contact Rad SO for disposal instructions.
9. Only persons instructed in the operation of the equipment and informed of the radiation hazards involved shall be authorized by the licensee to use the equipment without direct supervision.
10. Emissions from chromatographs containing tritium shall not be vented to occupied areas.

ANNEX D

INSTRUCTIONS FOR DISPOSAL OF CHEMICAL AND RADIOACTIVE WASTE

1. Use the glass waste bottles available from Stores and the appropriate label as supplied beside the disposal cabinet on the 5th floor of Bldg 1. Use a trolley or a safety transport container to carry the waste bottles from your lab to the 5th floor.

2. Keys to the storage cabinet will be held by the Defence Sciences (DS) Reception Office (located on 4th floor of Bldg 1) as well as to the Decontamination Unit and the Radiation Safety Officer (Rad SO).

3. Pickup from the storage cabinet will take place monthly unless a report of a full cabinet is given to the Rad SO. Emergency pickup of unusual items can be arranged by calling the Decontamination Unit or Rad SO.

4. Please make sure that no closed or sealed containers are put into the waste bottles. These only cause a great deal of difficulty for the Decontamination Unit. Waste bottles containing closed containers will be returned to their originator if problems occur frequently.

5. If you dispose of syringes or pipettes in waste bottles please rinse them out with decontaminant before disposal.

6. Do **not** use bleach solutions for decontamination unless it is absolutely necessary.

7. Do **not** overfill waste bottles.

8. Do **not** dispose of more than one radioactive isotope in a single waste jar.

9. Please place the waste bottles containing radioactive waste on the shelves of the storage cabinet that are marked for radioactive waste. Do **not** mix radioactive and nonradioactive waste bottles on the same shelf.

10. Please remember that the storage cabinet should only be used for the disposal of low level radioactive waste. If you expect to have high level waste contact the Rad SO **before** you begin your series of experiments.

11. Make sure that all waste bottles containing radioactive waste are marked with the radiation trefoil.

12. The storage cabinet must **not** be used for waste presenting a biohazard.

13. If you are not sure how to handle any waste please consult the Organic Lab, the Decontamination Unit or the Rad SO before problems occur. They will be happy to help find a safe solution to your waste disposal problem.

14. **Report any spills to the DS Reception Office immediately!** All necessary people will be contacted from there.

CHEMICAL WASTE

Room # ____ Originator _____ Date _____

Type of Waste (check applicable)

☐ Detoxified Toxic Waste
(indicate agent(s) decontaminated)

_____

☐ Heavy Metals _____
☐ General Lab Waste
☐ Flammable
☐ Nonflamable

RADIOACTIVE WASTE

Room # ____ Originator _____ Date _____

Isotope _____ Amount of active material _____

Type of Waste (check applicable)

☐ Detoxified Toxic Waste
(Indicate agent(s) decontaminated)

_____

☐ General Lab Waste
☐ Flammable
☐ Nonflamable

FIGURE D-1 WASTE DISPOSAL LABELS

ANNEX E

TYPICAL RADIOACTIVE MATERIAL FORMS USED AT DRES

INTERMEDIATE LABORATORY

RADIOCHEMICAL REGISTER

RADIOCHEMICAL (ISOTOPE):	SERIAL NO.
	ACTIVITY WHEN RECEIVED:
MANUFACTURER:	DATE OF MANUFACTURE:
TYPE OF CONTAINER:	
LOCATION:	RAD SO CONTROL NO.
RESPONSIBLE CUSTODIAN:	LICENCE NO.
DATE RECEIVED:	HALF LIFE (DAYS):
FORM AND QUANTITY:	
USE:	

COMMENTS:	

FIGURE E-1 RADIOCHEMICAL REGISTER

RADIOCHEMICAL USAGE FORM

DATE	AMOUNT USED ___mL = ____μCl (kBq)	AMOUNT REMAINING ____mL = _____μCl (kBq)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		

FIGURE E-2 RADIOCHEMICAL USAGE FORM

RADIOACTIVE MATERIAL REGISTER

SEALED SOURCES (GAUGES ETC.)

ISOTOPE:	SERIAL NO:
	ACTIVITY WHEN RECEIVED:
MANUFACTURER:	DATE OF MANUFACTURE:
TYPE OF CONTAINER:	
LOCATION:	RAD SO CONTROL NO.
RESPONSIBLE CUSTODIAN:	LICENCE NO.
DATED RECEIVED:	HALF LIFE (DAYS):
USE:	
DATE RETURNED - TO:	

LEAK TESTS			
DATE	TYPE OF TEST	INSPECTOR	RESULTS

LICENCE CONDITIONS TO BE OBSERVED:

_____

_____

FIGURE E-3 RADIOACTIVE MATERIAL REGISTER

DEFENCE RESEARCH ESTABLISHMENT SUFFIELD
SWAB TEST
(INTERMEDIATE LABORATORY)

TEST PREFORMED BY: _____ LICENCE NO. _____

MONITOR USED: _____

PROBE USED: _____

MATERIAL USED FOR WIPE: _____

SOLVENT USED: _____

LAB/AREA/EQUIPMENT MONITORED	TEST DATE	NO. OF SWABS	ISOTOPES	ORIGINAL ACTIVITY	HALF LIFE	DATE REC'D	MANUFACTURER	BACKGROUND (CPM)	BKGD + SWAB (CPM)	NET COUNTS (CPM)	DET Bq/cm^2

PROCEDURE USED FOR TEST: _____ RESULTS: _____

FIGURE E-4 SWAB TEST FORM

LEAK TEST

(SEALED SOURCES & GAUGES)

PERFORMED BY: _____ DATE: _____

MONITOR USED: _____ LICENCE: _____

PROBE USED: _____

MATERIAL USED FOR WIPE: _____

SOLVENT USED: _____

DEVICE	MODEL NO.	SERIAL NO.	ISOTOPE	SERIAL NO.	ORIGINAL ACTIVITY	DATE	DATE RECEIVED	MANUFACTURER	BACKGROUND CPM	BACKGROUND PLUS WIPE (CPM)	NET COUNTS (CPM)	NET Bq

PROCEDURE: _____ RESULTS: _____

FIGURE E-5 LEAK TEST FORM

RADIATION CONTAMINATION SWIPE RECORD SHEET

SERIAL	DATE	TIME	LOCATION IDENTIFICATION	* W/D	** EFF	*** AREA	RESULTS

* WET OR DRY SWIPE
** ESTIMATE EFFICIENCY OF SWIPE IN %
*** AREA SWIPED IN CM^2

FIGURE E-6 FOR SAMPLES SENT TO AECB

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This publication briefly describes the DRES ionizing radiation safety program, functions of the Radiation Safety Officer (Rad SO), user responsibilities and general procedures for working with radioisotopes.

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